Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. An ionized physical vapor deposition (I-PVD) apparatus, comprising:
a reaction chamber;
a target fixed on a top section inside the reaction chamber;
a wafer pedestal set up on a bottom section inside the reaction chamber;
an ionization unit set up between the target and the wafer pedestal; and
a conductive mesh set up between the ionization unit and the wafer pedestal.

[c2] 2. The I-PVD apparatus of claim 1, wherein the conductive mesh and the target are fabricated using an identical material.

[c3] 3. The I-PVD apparatus of claim 1, wherein the conductive mesh is set up at a smaller distance away from the wafer pedestal than the target.

[c4] 4. The I-PVD apparatus of claim 3, wherein the conductive mesh is separated from the wafer pedestal by a distance between 1 to 2 cm.

[c5] 5. The I-PVD apparatus of claim 1, wherein the top section of the reaction chamber serves as a first electrode and the conductive mesh serves as a second electrode.

[c6] 6. The I-PVD apparatus of claim 1, wherein the apparatus further comprises a first electrode fixed on the top section inside the reaction chamber and the target is fixed on the first electrode such that the conductive mesh serves as a second electrode.

[c7] 7. An ionized physical vapor deposition (I-PVD) process, comprising the steps of:
providing a plasma reaction chamber having a target and a wafer pedestal set up within the chamber, wherein an ionization unit is set up between the target and the wafer pedestal and a conductive mesh set up between the ionization unit and the wafer pedestal;
placing a wafer on the wafer pedestal; and
applying a negative bias voltage to the target and a smaller negative bias voltage to the conductive mesh for depositing a thin film over the wafer.

[c8] 8. The I-PVD process of claim 7, wherein before the step of depositing a thin film over the wafer, further comprises applying a negative bias voltage to the target without applying any bias voltage to the conductive

mesh to form a film layer over the wafer and then applying a negative bias voltage to the target and a smaller negative bias voltage to the conductive mesh to form a thin film over the film layer.

[c9] 9. The I-PVD process of claim 8, wherein the film layer has a thickness between 20% to 30% of the ultimate thickness of the thin film.

[c10] 10. The I-PVD process of claim 7, wherein the process of depositing the thin film further comprises passing a reactive gas into the reaction chamber.

[c11] 11. An ionized physical vapor deposition (I-PVD) process, comprising the steps of:
producing ionized metallic atoms inside a reaction chamber and accelerating the ionized metallic atoms at a first acceleration rate towards a wafer; and
passing the ionized metallic atoms through a conductive mesh before reaching the wafer such that the ionized metallic atoms are able to decelerate and form a metallic thin film on the wafer.

[c12] 12. The I-PVD process of claim 11, wherein before the step of forming a metallic thin film over the wafer, further comprising:
producing ionized metallic atoms inside the reaction

chamber such that the ionized metallic atoms accelerate at a second acceleration rate through the conductive mesh to reach the wafer and form a film layer over the wafer, wherein the second acceleration rate is smaller than the first acceleration rate; and

accelerating the ionized metallic atoms towards the wafer at the first acceleration rate such that the ionized metallic atoms decelerate after passing through the conductive mesh to form the metallic thin film over the film layer.

[c13] 13. The I-PVD process of claim 11, wherein the step of producing ionized metallic atoms further comprises passing a reactive gas into the reaction chamber.